CLAIMS

What is claimed is:

1. A method for optimizing command execution in a database system, wherein data records are stored on a plurality of data pages therein, the method comprising the steps of:

   (a) providing an identifier to each data page, the identifier indicating when any of the data records contained therein were last modified;

   (b) selecting a data record from a data page;

   (c) copying the selected data record to a second storage area;

   (d) verifying that the selected data record has not been modified since the time that it was copied to the second storage area based upon the identifier; and

   (e) executing the command.

2. The method of claim 1, wherein the copying step (c) includes:

   (c1) copying and storing the identifier to the second storage area.

3. The method of claim 2, wherein the verifying step (d) includes:

   (d1) determining a current identifier for the data page;

   (d2) comparing the current identifier with the stored identifier; and

   (d3) concluding the selected data record has not been modified when the current identifier is the same as the stored identifier.

4. The method of claim 3, wherein the verifying step (d) further includes:

2   (d4) determining whether the selected data record has not been modified

3   when the current identifier is not the same as the stored identifier by:

4   (d4a) accessing a current version of the selected data record on the

5   data page; and

6   (d4b) comparing the selected data record with the current version of

7   the selected data record.

1   5. The method of claim 4, wherein the identifier comprises a time stamp.

6. The method of claim 4, wherein the identifier comprises a log sequence number

(LSN).

7. The method of claim 1, wherein the second storage area is a temporary data

record in a temporary table.

8. The method of claim 1, wherein the command is a positioned UPDATE and

2   DELETE command in a relational database system supporting scrollable cursors and

3   optimistic concurrency.

1   9. A computer readable medium containing programming instructions for

2   optimizing command execution in a database system, wherein data records are stored on a

3   plurality of data pages therein, the programming instructions for:

4   (a) providing an identifier to each data page, the identifier indicating when any of

5   the data records contained therein were last modified;

6   (b) selecting a data record from a data page;

7   (b) copying the selected data record to a second storage area;

8   (c) verifying that the selected data record has not been modified since the time that it

9   was copied to the second storage area based upon the identifier; and

10   (d) executing the command.

1   10. The computer readable medium of claim 8, wherein the copying instruction (c)

2   includes:

3   (c1) copying and storing the identifier to the second storage area.

4   11. The computer readable medium of claim 9, wherein the verifying instruction (d)

2   includes:

3   (d1) determining a current identifier for the data page;

4   (d2) comparing the current identifier with the stored identifier; and

5   (d3) concluding the selected data record has not been modified when the

6   current identifier is the same as the stored identifier.

1   12. The computer readable medium of claim 10, wherein the verifying instruction (d)

2   further includes:

3   (d4) determining whether the selected data record has not been modified

4   when the current identifier is not the same as the stored identifier by:

5   (d4a) accessing a current version of the selected data record on the

6   data page; and

7   (d4b) comparing the selected data record with the current version of

8   the selected data record.

1   13. The computer readable medium of claim 12, wherein the identifier comprises a

2   log sequence number (LSN).

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1   14. The computer readable medium of claim 12, wherein the identifier comprises a

2   time stamp.

15. The computer readable medium of claim 9, wherein the second storage area is a

temporary data record in a temporary table.

16. The computer readable medium of claim 9, wherein the command is a positioned

UPDATE and DELETE command in a relational database system supporting scrollable

cursors and optimistic concurrency.

1   17. A relational database management system comprising:

2   data records stored on a plurality of data pages;

3   means for providing an identifier on each data page, the identifier indicating when

4   any of the data records contained therein were last modified;

5   means for selecting a data record from a data page;

6   means for copying and storing the selected data record and the identifier from the

7　　　data page to a second storage area;

8　　　　　means for determining a current identifier from the data page; and

9　　　　　means for verifying that the selected data record has not been modified since the

10　　　time that it was copied to the second storage area by determining that the stored identifier is

11　　　the same as the current identifier from the data page.

1　　　18. The system of claim 17, wherein the second storage area is a temporary data

2　　　record in a temporary table.

1　　　19. The system of claim 17, wherein the relational database management system

2　　　supports a positioned UPDATE and DELETE command and scrollable cursors and

3　　　optimistic concurrency.

1　　　20. The system of claim 17, wherein the identifier comprises a log sequence number

2　　　(LSN).

1　　　21. The system of claim 17, wherein the identifier comprises a time stamp